

Session 2

Learning As We Grow: Development and Learning

Developed by Linda Darling-Hammond, Suzanne Orcutt, and Melissa Cheung
With Contributions From James Comer, M.D.
Stanford University School of Education

I. Key Questions and Learning Objectives

Key Questions

- How do children develop and learn?
- How can teachers support students' development and learning?

Learning Objectives

- **Pathways for development**—Teachers will understand that students develop along several developmental pathways, all of which interact and play a part in students' learning. Teachers will learn how they can enhance learning by observing their students and supporting their development across these pathways.
- **Developmental progression**—Teachers will understand that development progresses sequentially, that teaching is more effective when it is appropriate to students' developmental stages and within their "zones of proximal development," and that development can be supported by teaching.
- **Assessing and supporting readiness**—Teachers will begin to recognize students' developmental signs of readiness across the different pathways. Teachers will understand the need to assess students' current levels of skill and understanding to make decisions about what students are ready to learn and how they can best be taught.

II. Session Overview

As a teacher, you are really an instrument of learning. You can help the child grow in all the developmental pathways. That growth is what makes academic learning most possible. If you understand this, you will find all kinds of opportunities to help children grow and develop and learn what it takes to be successful in school and as an adult.

—James P. Comer, M.D. (2001)

Children’s growth and development occurs across several interrelated yet distinct domains, including physical, mental, social, emotional, and moral. Two important themes are central to understanding children’s progress through their developmental stages. First, physical, cognitive, emotional, and social changes are all occurring simultaneously. Although these arenas develop simultaneously, they do not necessarily develop in tandem. A child may be very advanced in his cognitive development, for example, but less mature in terms of social development and may need more assistance in this area.

Second, all of the internal changes that children and adolescents experience at their important transition points are mirrored by profound changes in their peer, school, and family lives. Understanding development requires not only a consideration of the “whole child,” but also the whole child developing in particular social contexts. These contexts and learning environments influence cognitive reasoning, social and emotional learning, personality and identity development, and moral reasoning.

Developmental Pathways

To understand and support the development and learning of her students, a teacher must be able to take a developmental perspective. This includes understanding that children move through several stages or sequences of development (discussed below) and that they develop through several “pathways of development.” These pathways include: physical, social-interactive, emotional, psychological, cognitive, linguistic, and moral-ethical. Within each pathway, teachers must recognize how *children vary* across and within ages, how *social and cultural contexts* shape these different pathways in different ways, how these pathways *interact* and influence one another; and finally, the *implications* these pathways have for instruction. Teachers who teach from a developmental perspective strive to help children continually progress in each of these domains.

The **physical** pathway refers to the body’s biological development, including the development of the brain, motor skills, and coordination. These physical changes influence students’ learning, thinking, and performance. For example, learning to read involves biological development as well as cognitive development. Children’s visual abilities (including binocularity and tracking) must mature before they can comfortably focus on and track small print. These abilities are generally acquired sometime between the ages of four and eight, often around age six or seven. At that point, children also have a well-developed sense of one-to-one correspondence and can comprehend abstract symbols, making decoding of text easier (Cole & Cole, 1993, p. 476). Similarly, fine motor development is essential as students learn to hold and manipulate small objects, a precursor to learning to write.

The **social-interactive** pathway refers to children’s increasing ability to communicate and interact with a variety of people in different social situations. It also refers to the ability to be empathetic, to know how to act appropriately according to social expectations, and to appreciate differences in people. Social abilities develop over time and are shaped by the social and cultural contexts in which children live. For example, in some cultures children are taught to interact freely with adults and to ask and answer questions. In others, such interactions are viewed as inappropriate. In some cultures, opinions are expressed directly. In others, such expression is impolite. Teachers need to understand that social norms are learned and that social skills must often be explicitly taught, rather than assumed. When children’s behavior differs from classroom norms or expectations, it is important for teachers to explain the desired behavior to children and model it for them rather than merely punishing them. For example, if a student interrupts a classroom discussion, the teacher can model active listening skills and specific strategies for gaining attention and speaking so that students can take turns expressing their ideas.

The **emotional** pathway refers to the child’s growing ability to recognize, respond to, and “manage” feelings—what some might call the development of “emotional intelligence.” [See Session 5, Emotions and Learning.] Supporting children’s emotional development involves helping students become skilled in recognizing and

II. Session Overview, cont'd.

understanding their own and others' emotions, learn how to express their feelings and concerns, and handle frustrations productively. These abilities will support their ability to persevere in the face of difficulties and solve problems as they arise without losing control or giving up. Emotionally supportive classrooms also help children to feel safe so that they can learn effectively, because anxiety impedes the ability to focus and learn.

The **cognitive** pathway refers to how information is processed, assimilated, and used in an increasingly sophisticated manner as children develop. Over time and with support, children develop abilities to generalize from information, to manipulate information, to act on their environment and to learn from it. [See Session 3, Cognitive Processing.] Although cognitive development is progressive and has certain common milestones, children reach these milestones at different ages depending on the learning experiences they have had and what is valued and nurtured within their social context. Differences in cognitive development are also related to individual differences in how people process information and on the various strengths and intelligences they exhibit. [See Session 4, Multiple Intelligences.] Teachers need to be able to evaluate students' levels of cognitive development in different domains, how they best process information, and their areas of strength in order to structure learning experiences, pace instruction, and provide information in ways that children can best understand it.

The **linguistic** pathway refers to children's abilities both to receive communications and to express themselves. To help children develop their linguistic abilities, teachers need to understand how language is acquired. They also need to understand the structure of the language in which the child is expected to function, how social and cultural contexts affects language acquisition and development, and how language development is related to cognitive development. The linguistic abilities children develop in their native language serve as a foundation for literacy and learning in school, including in a second language (Fillmore & Snow, 2000). This has application for teachers of English-language learners to help children acquire the literacy skills they need to succeed in school.

The **psychological** pathway refers to the development of a sense of self, including feelings of adequacy, self-worth, and competence, as well as a sense of identity. All humans ask questions about "Who am I?" and "What does it mean to be me?" Eric Erikson's (1963) work on identity suggests that "the construction of a sense of personal identity is a lifetime activity, as well as being the defining developmental task of the teenage years" (Elkind, 1999). Students identify with their friends and may form groups associated with interests, religion, sports, music, or other shared activities. Students may also form self-identities around their race, nationality, ethnicity, and geography if these are salient variables in the environment in which they grow up. By recognizing student strengths, interests, and accomplishments, teachers can help students develop a positive identity and a sense of belonging, purpose, and direction in the world.

The development of identity determines not only how children and adolescents feel about themselves, but also what they see as salient to their lives and compatible with social expectations of their abilities and behavior. Children develop self-concepts in a number of domains (e.g., academic, social/interpersonal, physical) and these guide their investments of time and effort, as well as their self-confidence. Teachers need to understand how social messages and school/teacher behaviors can influence the development of an academic self-concept that will support ongoing effort in school. Students need to see themselves as able to achieve if they are to put their energy into schoolwork.

The **moral-ethical** pathway refers to the ability to understand moral thoughts and action, to respect the rights of others, to evaluate one's own behavior, and to act in the interests of others as well as oneself. In children, self-interest is normal and necessary, but it is also important that they learn to think about the common good. Teachers need to understand the developmental patterns that are associated with the development of concepts of justice and social welfare, and the ways in which teaching can help to support the development of citizenship.

Children are born with potential in all these arenas and must be supported in each of these throughout their education. Understanding and appreciating all these pathways—not only the cognitive one, which may often receive the most attention in school—can lead teachers to a better understanding of the "whole child" that can ultimately lead children to greater success and accomplishment in school. Although all children develop along these various routes, they do not necessarily progress uniformly. All children do not march through these stages at the same pace at the same time and in the same way. In fact, one child may be at quite different places in these pathways. While a child is always developing simultaneously in all these areas, the rate of the child's growth in different areas may vary.

II. Session Overview, cont'd.

Developmentally prepared teachers further understand that children's development along these pathways can interact in many ways. For instance, a child who is emotionally insecure may be unwilling to risk engaging in classroom discussions for fear of being ridiculed and may consequently not express his thoughts or gain important feedback that would help develop his understanding about particular ideas. The teacher may need to offer feedback in ways that are intentionally reassuring in order to support this child's learning and emotional growth. She may also need to help him learn strategies to support risk-taking so that he can overcome his fears.

Developmentally Appropriate Teaching

What can teachers do to support development? Developmentally appropriate teaching includes a variety of key practices: recognizing and supporting the development of students' readiness; selecting developmentally appropriate tasks; tapping into developmental periods to capitalize on student interests; working with students' individual differences; and recognizing and affirming students' cultures and experiences while moving toward mainstream competencies.

Developmental psychologist Jean Piaget (1896-1980) outlined a stage theory of cognitive development (Piaget & Inhelder, 1969). Although Piaget's ideas have been amended over time, much of what he found in his research remains a foundation for cognitive science. Piaget described three aspects of cognitive growth:

- Children develop "mental structures" as they gain skills and experiences;
- These structures form when the child acts on objects in the environment or when she performs "operations"; and
- The child's intelligence advances through a sequence of "stages" that change the way the child thinks and acts.

Piaget outlined growth from birth to adulthood through four stages of cognitive development: sensorimotor, pre-operational, concrete, and formal operational or abstract thinking (Piaget, cited in Presseisen, 1977, pp. 167-168).

Developmental Readiness

Developmental theory includes the concept of readiness for learning. Physical development, mental intelligence, and social experiences all play a part in children's and adolescents' readiness to learn in specific ways. Development in different domains occurs at different times for different children—for some much earlier than for others. The kinds of prior experiences children have had have much to do with what they can use and profit from next. However, children's stages or levels of cognitive and physical maturation do not preclude preparing them to be ready to learn in new ways. Teachers need to be able both to watch a child for developmental signs of readiness and also to help students become more ready for new accomplishments in each domain of development.

Russian teacher and developmental psychologist Lev Vygotsky (1896-1933), like Piaget, felt that teaching should respond to the child's developmental stage. However, whereas Piaget focused on individual development, Vygotsky argued that individual capacities develop in social contexts designed to support them. Jeannie Oakes and Martin Lipton (1999) describe his contribution in this way:

Whereas Piaget saw the child as very much an independent learner, already equipped to draw in and make sense of the environment (including relationships with others), Vygotsky stressed a much more essential and interdependent relationship between child and adult. Vygotsky focused on the role of social opportunities in learning, blurring the distinction between social experiences and mental processes (Oakes & Lipton, 1999, p. 80).

According to Vygotsky, learning that takes place externally in a social context is gradually internalized by the individual: social knowledge becomes individual knowledge. However, not all social interactions lead to individual learning; such learning requires guidance in social settings, with the support and assistance of the teacher, coach, or mentor. When social interactions cause students to challenge and restructure knowledge so that it makes sense to them, they progress in their thinking and development (Brown & Palincsar, 1989).

II. Session Overview, cont'd.

Vygotsky emphasized that cognitive development is supported through language and cultural symbols and is nurtured by teachers within a particular student's "zone of proximal development" (ZPD). The idea of a ZPD represents the difference between what a child can do on his own and what he can do with some assistance. To achieve optimal learning within this zone, Vygotsky explained that the adult needs to determine the child's *actual* developmental level when working independently, and the child's *potential* developmental level when working with adult guidance or with the assistance of more capable peers (Vygotsky, 1978). According to this theory, good instruction is in advance of development and helps to push the child to a new level of understanding within the ZPD. In this process, the adult or tutor assists the learner until the student is able to perform the task independently.

Vygotsky encouraged teachers to assess where students are in a particular domain, what they understand, and what experiences they have had, and to determine how, with assistance, students can be helped to advance to another level within the ZPD. [See Session 7, Learning in a Social Context.] Vygotsky suggested that students could be *helped* to develop if they are taught at the appropriate level, rather than the teacher merely waiting for greater maturity to make them ready. Teachers can assist students in advancing within the ZPD by setting tasks that build on and go slightly beyond what they know, providing models of performance, asking leading questions, and providing direct instruction. Nathaniel Gage and David Berliner offer this example of how a teacher might work within a young student's zone of proximal development:

[A] child working alone with crayons may produce a strange drawing of a human—one eye, a huge head, and tiny legs. But someone more competent (an older sibling, a teacher) might ask, 'How many eyes does a person have? How about ears; do people have ears?' Changes in the child's drawings will reflect this kind of socially mediated learning. The difference between what the child can do on her own and what she can do with some mentoring is the ZPD (Gage & Berliner, 1998, p. 112).

Each student functions within multiple zones of development that vary from one domain to the next. A student may need one kind of assistance as she completes a long division problem, and yet another kind of assistance as she writes a short story. Careful observation, question asking, assessment of work, and one-on-one interactions with students provide the kinds of information teachers need to determine what level and type of assistance a student may need.

Supporting Learning as Children Grow

Early childhood—During the prekindergarten years, children are concerned with exploring and understanding the physical world with the use of the senses—seeing, hearing, touching, smelling, feeling, and tasting as means of exploring the environment. Physical abilities begin to develop in early childhood including locomotion, balance, and body and space perception (Elkind, 2001). Developmentally appropriate instruction in these years encourages exploration and provides environmental stimuli for understanding how physical principles in the world work.

Gradually, children begin to develop an understanding of different symbols and what they represent. With feedback and support, children begin to classify objects. They also acquire language at this stage of development. Developmentally appropriate teaching in this stage emphasizes physical manipulation of objects and a language-rich environment that allows interactive talking, listening, singing, and playing to develop thought and language.

Middle childhood—Piaget suggested that a transition occurs in children to concrete operational thought; that is, the point at which "they are now able to operate upon symbols in the way that they learned to act upon and manipulate objects in infancy" (Elkind, 2001, p. 125). This point occurs around the age of seven (approximately second grade). Since Piaget's early work took place, however, a substantial amount of additional research has suggested that the range of ages at which children achieve particular understandings is much wider than Piaget thought, and, furthermore, that this progression is not entirely biologically determined. Children can be assisted in developing these abilities. As children begin to understand a broader range of phenomena, they can organize things hierarchically and understand the inclusion of a subset of objects within a broader whole. Over time, children will learn to manipulate one variable at a time with a one-to-one correspondence and then eventually learn to deal with more than one variable. Children at this stage also acquire an understanding of rules that helps them to develop socially. They are beginning to detach themselves from parents, and other adults and peers become more important.

II. Session Overview, cont'd.

Developmentally appropriate teaching in this stage emphasizes concrete learning while it also helps children to begin to develop symbolic thinking. Because students' experience base is not yet well built, teachers need to let students see things first hand and to encounter things in concrete ways. For example, developmentally appropriate learning experiences might include taking students on field trips to see the things they are studying, building things to see how shapes and measures fit together, planting a garden and watching the seeds grow to understand plant growth. Children learn through the use of manipulatives in the concrete operational stage (and after). In math class, for example, children using Cuisinaire rods or other manipulative objects may learn that when we put 10 of these units together, the new unit is 10 times larger than a single unit—that is what "10" means. This manipulation gives them a deeper sense of number and a firmer grasp of what it means to add or subtract, group and multiply or divide, than simply memorizing arithmetic facts with little understanding of what they mean.

In science class, children explore and "act on" objects, test their ideas, and apply what they have discovered to new situations. As they are involved in measuring, weighing, classifying (e.g., types of plants, animals, or rocks) and watching and recording phenomena, they are making sense of their concrete world. In reading, students are developing the one-to-one correspondence they need to manipulate symbols and letters with sounds and phonemes. Children need to learn to sequence letters and words and put them in order. It is important for students to learn in an environment that allows active use of materials and supports exploration and engagement of new ideas:

Piaget's general prescription is a familiar one: 'To know an object, to know an event, is not simply to look at it and make a mental copy of image of it. To know an object is to act upon it' (Appel, 1977, p. 190).

Teachers can also tap into students' developmental interests as a way of enhancing motivation in school tasks. For example, because children between the ages of about eight and 12 like to simulate the things that adults do, like playing at being firefighters or doctors, teachers can organize aspects of the curriculum around these interests and use them as a springboard for areas of skill development.

Developmentally appropriate practice in early and middle childhood education includes these features:

- The curriculum attends to social, emotional, and physical goals as well as cognitive ones.
- A wide variety of learning experiences, materials and equipment, and instructional strategies is used strategically to accommodate individual differences in children's learning and interests.
- Curriculum and instruction support individual, cultural, and linguistic diversity, and encourage positive relationships with children's families.
- Curriculum builds on what children already know and are able to do (activating prior knowledge) to consolidate their learning and foster acquisition of new concepts and skills.
- The curriculum encourages children to learn actively—by observing, collecting information, describing, counting, manipulating, and using what they have studied.
- Content and skills of application are linked, rather than taught in isolation, so as to encourage development of thinking, reasoning, decision making, and problem solving.
- To the greatest extent possible, teaching reflects children's naturally recurring learning cycle, which begins with awareness and progresses through exploration, inquiry, and use of constructed knowledge in authentic applications. Teachers help children see how previous learning can be applied in the current situation.
- Teachers convey respect for children's thinking by probing their ideas with questions like "What happens if...?" and "What else works like this?" and by using mistakes as occasions for further learning (National Association for the Education of Young Children, 2002).

Later childhood and adolescence—These features also pertain to education of older children and adolescents. However, a qualitative change in thinking occurs with the transition from concrete operations to formal operations. As students progress cognitively, they move beyond one-to-one correspondence to manipulating multiple variables in more complicated ways, looking for patterns, and thinking abstractly. Although Piaget suggested that

II. Session Overview, cont'd.

this transition happens fairly dramatically at the age of about 12 to 14, recent research has suggested that students can exhibit features of formal thinking at much earlier ages and that their ability to think in complex ways can be encouraged in elementary school. They may learn the scientific method and be engaged in developing hypotheses and formally testing them in science, thinking systematically about how to examine alternative explanations. They may be working with multiple variables in algebra, linking their explorations of number manipulations to actual real-world examples, but looking across individual problems for patterns and broader abstractions. They can think inferentially. At this point of development, students engage in “combinatorial reasoning” that requires understanding how multiple variables can be combined in many different ways. If students have built a strong foundation of concrete understandings, they can transition to abstract understandings, learning ideas that are fundamentally symbolic in nature as they study subjects like grammar, algebra, and the use of simile and metaphor in literature.

In the later adolescent years during and beyond high school, formal operational reasoning deepens. Students learn to go beyond simple explanations to develop more complex thinking. If given the appropriate learning opportunities, students begin to see the world from multiple perspectives, not just their own. They can develop more sophisticated hypothesis testing and more rigorously disciplined thinking. They can learn to evaluate evidence, draw inferences, and weigh and balance ideas. They can learn to think more metacognitively: to reflect and analyze their own thinking and behavior and those of others. They can plan how to study and learn, and they can make self-assessments. [See Session 9, Metacognition.]

At this stage students develop logic and the ability to see multiple perspectives on philosophical and moral issues. These interests and budding abilities can be tapped in the classroom. For example, in social studies, students can benefit from being asked to engage in structured debates that encourage their need to sort out and argue their opinions and help them learn systematic ways of assembling and organizing evidence to make a logical argument. Students learn to take on others’ perspectives and understand different points of view. Teachers can use this opportunity to help students develop emotionally and socially while their cognitive development is unfolding. They can help students consider issues of social justice, learn how to treat other human beings equitably, and deal with social pressures typical in adolescence.

The development of abstract thinking depends in substantial part on the learning environment; not all people actually attain the ability to think abstractly and to reason formally. The kind of education a person receives has a great deal to do with whether these capacities are developed. Developmentally appropriate teaching at the formal operational stage of development involves helping students learn how to develop their reasoning abilities and how to examine ideas and phenomena systematically. For example, teachers may teach students to test a hypothesis in science by controlling one variable and simultaneously manipulating another variable. Higher level mathematics understandings may be supported by teachers demonstrating for students how to reason inductively from examples to a generalization.

Developing Readiness

Teaching in “developmentally appropriate” ways means being cognizant of where students are in the processes of their development and taking advantage of their readiness. It also means teaching to support development, not simply waiting for students to be ready (Bruner, 1960).

What can teachers do to teach for readiness? Teachers can teach in ways that are attuned to students’ existing skills and ways of learning while developing new understanding and providing the tools that are needed for the next stage. Jerome Bruner’s concept of a “spiral curriculum” is based on the idea that “any subject can be taught effectively in some intellectually honest form to any child at any stage of development” (Bruner, 1960, p. 33). While this provocative idea may not apply in all instances, many fundamental concepts can be taught at one age and then revisited later to be appreciated in greater depth. For example, even though students are not generally ready to manipulate multiple variables until around the age of 13 or 14, a teacher can introduce some beginning concepts of algebra in the early grades using concrete objects rather than using abstract representations of numbers like “x” and “y.” Similarly, helping younger students understand how shadows are formed will later help them understand eclipses and lunar phases. Teachers can help students become ready to comprehend the upper stages of higher-order thinking.

II. Session Overview, cont'd.

Teachers can use children's experiences strategically in encouraging their further development. For example, if a student already knows a lot about a particular topic because it is part of his home or community experiences, this prior knowledge can be the basis of a writing assignment so that the development of writing skills can be fostered by the ready availability of knowledge about the subject at hand. The teacher might help the student develop his thinking and ability to record details by asking questions about the topic that prompt the student to write an elaborated narrative. Thus, experience and development in one area can be used strategically to foster development in another.

The Importance of Context: Stage-Environment Fit

Teachers can set the stage for students by creating developmentally appropriate classrooms and schools in which their learning can unfold in synch with their development. As we have discussed, "developmentally appropriate" does not imply that students can do only what a static view of development might predict is likely to occur at a particular age or stage. Developmentally appropriate schools reflect "the whole child" (Weissman, Kaminsky, & Hendrick, 1998), acknowledging that students will be developing differently in different areas and that their development can be assisted with strategic support.

Although supporting development is important, David Elkind cautions that hurrying a child's growth too much can increase stress and create personal identity problems. Being asked to perform tasks that are developmentally inappropriate may persuade children forever that they cannot do things that they would be perfectly able to do had they been given more time. He notes that:

Children who are hurried as children may not understand or resent the hurrying until they become adolescent. Not surprisingly, the stresses of growing up fast often result in troubled and troublesome behavior during adolescence (Elkind, 1988, p. 12).

Researchers have learned that academic achievement, mental health, and identity develop optimally when the school and home environment "fit" the child's needs. As Elkind explains, "This means that educational practice can be improved by a better match between the child's level of development and that embedded in the tests and curricula" (Elkind, 1988, pp. 97-98). For example, Jacquelyn Eccles found "when adolescents are in settings (in school, at home, or in community programs) that are not attuned to their needs and emerging independence, they can lose confidence in themselves and slip into negative behavior patterns such as truancy and school dropout" (Eccles, 1999, p. 30). She found that many departmentalized middle schools create impersonal, highly competitive settings that feature more rote learning and less participation and choice just at the time adolescents need affirmation of their competence, a sense of belonging, and opportunities to develop independent thinking. Developmentally appropriate schools support children's and adolescents' growing autonomy and collaboration, provide students with challenging opportunities for discovery, build their confidence, and encourage expression of their ideas and opinions.

Part of the process of supporting development is supporting identity development—a student's sense that he is—or can be—capable in various domains. Teachers need to be sensitive to the social messages and expectations they communicate to students, especially those who have been discouraged from feeling competent in various domains in the past. The development of skills and attitudes depends in part on whether and how students are affirmed in their efforts. Do students get the message from their teachers' interest in and comments about their work that girls can be smart in math; that students of color can be academically successful; that it is appropriate for boys to show their feelings? Teachers need to be cognizant of the messages students receive from the media as well as the messages they receive from school. Positive feedback for students about their areas of competence and opportunities to take on responsibility successfully are extremely important. A developmentally healthy environment will support ways in which cognitive reasoning develops with healthy identity development and moral reasoning about how to support and care for others.

Developmentally appropriate schools understand that students learn through social interaction as well as individual effort; thus, they are collaborative. To encourage strong identity development, they provide opportunities for all students equally. They affirm and strengthen students' sense of themselves and help them find and develop areas of competence. They give students increasing opportunities to make decisions and to act responsibly within the school and the community. For example, schools may involve students in school governance as well as in regular community service and internships in the community where they can see themselves as increasingly responsible, autonomous actors and see how what they are learning in school can be applied in the world.

III. Additional Session Readings

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.) (1999). How children learn (Chapter 4). In *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press. [Online]. Available: <http://books.nap.edu/html/howpeople1>.

Guidelines for appropriate curriculum content and assessment in programs serving children ages 3 through 8: A position statement of the National Association for the Education for Young Children and the National Association of Early Childhood Specialists in State Departments of Education. Adopted November, 1990. [Online]. Available: http://www.naeyc.org/resources/position_statements/pscag98.pdf.

IV. Session Activities

Getting Started

Answer one of the following questions in a free-write, pair-share, or small-group discussion.

1. This session discusses several different aspects of development—cognitive, social, emotional, moral, and physical. Think of a time in your life when you remember experiencing a great spurt in one of these areas of development.

- How did this affect you?
- What experiences supported your development in this area? You could also think about a student, sibling, or other young person you know.

OR

2. Think of a time in your life when two of these areas of development seemed “out of synch.” For instance, your social development seemed to lag behind your intellectual abilities. Describe a specific instance if you can.

- In what ways did this affect you?
- How might teachers respond to this situation?

OR

3. Think of a time you have seen or experienced a developmentally inappropriate task. Describe the task and the learner.

- What made the task inappropriate for the developmental readiness of the learner?
- What might have made it a better fit?

<p>To the Facilitator: These activities can be used as session warm-ups or as activities that occur after video viewing.</p>

IV. Session Activities, cont'd.

Discussion of Session Readings

To the Facilitator: You may want to select questions from the Other Learning Activities and Assessments section to launch a discussion of the session readings. The questions used for the Checking for Understanding activities may be a particularly helpful resource.

Session Video

This video demonstrates Jerome Bruner's (1960) notion of a "spiral curriculum" using the scientific concepts of mass, speed, and momentum. Bruner claims that we can teach any concept to a child at any stage of development in an "intellectually honest" manner. This video shows the early teaching of the physics concept of velocity with first-grade students; demonstrates how the effects of mass and velocity on momentum are explored with eighth-grade students; and then shows a more sophisticated discussion of the conservation of momentum with 12th-grade students.

Background on Teachers

Fe MacLean is a first grade-teacher at Paddock Elementary School in the small, culturally diverse town of Milan, Michigan. Ms. MacLean, with 36 years of teaching experience, holds a bachelor's degree in elementary education from the Philippine Normal College, and a master's degree in learning and cognitive development from the University of Michigan. She is a National Board-certified teacher and a winner of the Presidential Award for Excellence in Mathematics and Science Teaching (2000). In 2000, she received a Fulbright Memorial Award for Teacher Study in Japan.

Ms. MacLean is working with her first-grade students to answer questions about what factors influence the speed of objects traveling on an incline. Her students engage in concrete operational thinking as they use manipulatives like incline ramps, blocks, and balls to answer their questions about velocity.

George Mixon is a seventh- and eighth-grade science teacher at Birmingham Covington School, Birmingham, Michigan. He has 11 years of teaching experience and holds a bachelor's degree in biology from Denison University. Mr. Mixon is currently working on his master's degree in education administration at Oakland (Michigan) University. He has presented his work on science projects to the National Association for Independent Schools and conducted research on dolphins in Hawaii.

Mr. Mixon encourages his eighth-grade students' development of formal operational reasoning as they answer the question: "How do mass and velocity affect momentum?" Mr. Mixon's students are developing their capacity for abstract thought as they use the scientific method to examine multiple variables, develop and test hypotheses, and interpret and apply scientific and mathematical procedures.

Ken Gillam teaches 12th-grade physics at Detroit High School for the Fine and Performing Arts, Detroit, Michigan. A 15-year veteran of teaching, he holds a bachelor's degree in physics from Purdue University and a master's degree in science education from the University of Missouri. Mr. Gillam was part of a University of Missouri teaching team that taught instrumental methods to high school teachers. He was South Central Missouri Science Teacher of the Year in 1997, is a National Board-certified teacher, and a mentor for National Board candidates.

Mr. Gillam helps his 12th-grade students develop complex levels of formal operational thinking as they predict and determine the velocity of a vehicle to measure its impact on different barriers. Mr. Gillam's students are learning to evaluate evidence in the context of multiple variables and to draw inferences about the conservation of momentum.

IV. Session Activities, cont'd.

Discussion of Session Video

To the Facilitator: You may want to pause the tape at the following points to discuss these questions. If you are watching a real-time broadcast on the Annenberg/CPB Channel, you may want to consider the questions as you watch and discuss some of them afterward.

1. Supporting Learning as Children Grow: Middle Childhood (Fe MacLean)

Video Cue: *The Learning Classroom* icon fades out at approximately 11:30 into the program.

Audio Cue: Ms. MacLean says, "So to me they are understanding that the height of a ramp, or the steepness, is related to momentum or speed."

- What do you notice about the strategies Ms. MacLean uses to teach her students about observation and data collection?
 - How are these strategies particularly appropriate to young children?
- What strategies does Ms. MacLean use to assess her students' learning?
 - What do you think a teacher can learn about students' thinking from strategies like these?
- How does Ms. MacLean's teaching develop her students' readiness as well as respond to where the students are developmentally?

2. Supporting Learning as Children Grow: Later Childhood (George Mixon)

Video Cue: *The Learning Classroom* icon fades out at approximately 19:00 into the program.

Audio Cue: Mr. Mixon says, "But I still, there is something that you have to revisit to make sure that they understand it."

- What do you notice Mr. Mixon doing to encourage his students' development of hypotheses?
- How does Mr. Mixon's teaching support his students' development of formal operational reasoning (or abstract thinking)?

3. Supporting Learning as Children Grow: Adolescence (Ken Gillam)

Video Cue: *The Learning Classroom* icon fades out at approximately 26:15 into the program.

Audio Cue: Mr. Gillam says, "And you begin to put together a structure, a pattern into not only abstract, but into being able to bring it all together and synthesize something that may be totally unique in their analysis."

- What do you feel is most effective about how Mr. Gillam encourages his students to evaluate evidence, draw inferences, and predict outcomes?
- How does Mr. Gillam's teaching help his students deepen their formal operational reasoning?
- What do you notice about the additional abilities of students at each developmental level?
 - What are older students capable of that younger students were not yet ready to do?
 - What do you think helped them develop these abilities?

V. Other Learning Activities and Assessments

To the Facilitator: These activities and assessments are for you to choose from according to your group's needs and interests. Many of the activities offered here would work equally well as assignments both inside and outside of class. You may want to use class time to prepare for and/or reflect on any activities assigned as homework.

Applications

1. Journal

Reflect on what you learned in this class.

- What was discussed that reinforced something you already knew or believed about children's development and learning?
- What, if anything, was new or surprising to you?
- How might these realizations affect what you do in the classroom?

2. Field Assignments

- Individual child*—Decide on a concept or skill you are going to teach, and assess the readiness of one child in your classroom through a conversation or interview, journal or free-write, drawing or graphic, or a more formal pretest.
 - What prior knowledge does she have of the concept or skill you plan to teach?
 - What misconceptions does she have of this concept?
 - What kind of assistance do you think you will need to provide to enable the student to take the next steps toward understanding?
- Whole class*—Think about a skill or concept that you (or a teacher you are working with) are about to teach or have recently taught.
 - How will you (did you) find out if your students are ready to learn this?
 - What kinds of skills or abilities in different domains (e.g., cognitive, linguistic, physical, social-interactive) are required to successfully accomplish the task(s)?
 - What assumptions are you (were you) making about what students have already mastered?
 - What evidence do you have of this mastery?
 - How will you (did you) teach so that students at different levels of development are (were) able to be assisted by you or peers in their learning?
- Observation and interview*—Observe and interview a child to learn more about where this student is in the process of her development.
 - What do you notice about the child's development relative to many other children's development her age in each of the following areas:
 - *Physical maturation*—What large motor skills and coordination, fine motor skills, and/or biological development does the child demonstrate?

V. Other Learning Activities and Assessments, cont'd.

- *Social-emotional development*—How does the child interact with others (outgoing, shy, considerate, self-focused)? How does she handle difficulties or frustrations? What is her emotional temperament (calm, anxious, etc.)?
- *Cognitive development*—What kinds of reasoning do you see the child exhibiting? Do you see examples of concrete operational thinking, or of formal operational or abstract thinking (e.g., ability to use symbols, manipulate variables)?
- *Moral-ethical development*—How does the child think about right and wrong and the rights of others? Has she developed a sense of empathy and/or social responsibility?
- Connect what you have seen and heard from the child to the reading you are doing for this course.

3. Create an Action Plan

Create an assessment that would inform you about the range of developmental levels in your classroom. Pick a skill area (e.g., taking notes), and plan an assessment that would enable you to figure out the prior experiences and understanding of your students.

Checking for Understanding

1. Short-Answer Questions

- Summarize the idea of “zone of proximal development” (ZPD) and give an illustration of how someone can be assisted to progress on a specific task within the ZPD. How can teachers use this idea in making teaching decisions?
- What are some signs that a student is engaging in formal operational thinking?

2. Essay Questions

- Provide a specific example in your subject area/grade level of how you can assess students’ skills and conceptual development to make decisions about what students are ready to learn in a particular domain. On the basis of what you learn, how would you provide assistance to further your students’ learning?
- Explain how physical development, intellectual development, and social experiences all play a part in students’ cognitive development. Using one student as a specific example, describe how he has developed differently in different areas—physical, mental, social, emotional, and moral domains. How might you guide and support this student’s development by providing strategic assistance?

3. Reflective Essay

Write a reflective essay on what you learned in this unit.

- What have you have learned about developmentally appropriate learning and teaching?
- How does the concept of readiness for learning affect your own teaching?
- What ideas do you have for providing experiences that support students’ development?
- What questions remain for you about teaching in developmentally appropriate ways?

V. Other Learning Activities and Assessments, cont'd.

Long-Term Assignments

Curriculum Case Study

Consider your case study learning problem from a developmental perspective. (Note: If your curriculum case is on a unit you plan to teach in the future, answer in the form of what you project for that unit. You may have to anticipate some of your students' reactions.)

- How did your students' developmental readiness factor into the events in your case?
- How did you teach for students' readiness to learn?
- What instructional activities did you plan (or will you plan in the future) to help students become more ready for new accomplishments in each domain of development?

To the Facilitator: You will find other learning activities on the course Web site at www.learner.org/channel/courses/learning-classroom. You will want to look ahead to assign learners the reading and any homework for the next session.

VI. Web Sites and Organizations

Developmental Studies Center: <http://www.devstu.org/>

The Developmental Studies Center (DSC) is a nonprofit organization dedicated to fostering children's intellectual, ethical, and social development. The DSC has developed in-school and after-school programs to support students' development. Programs focus on academic concerns, such as literacy and mathematics instruction, as well as character development and creating "caring communities."

Child & Family WebGuide: <http://www.cfw.tufts.edu/>

This Web site presents an extensive collection of research-based resources about child development, developed by researchers at Tufts University and the Society for Research in Child Development. Categories of resources include education/learning, health/mental health, childcare/daycare, and family/parenting, as well as information about typical development.

National Association for Education of Young Children: <http://www.naeyc.org>

The National Association for Education of Young Children is an organization of educators dedicated to the improvement of programs for children from birth through third grade. The association's Web site provides information about professional development, and community and parent resources.

Comer School Development Program: <http://www.med.yale.edu/comer/>

The Comer School Development Program, residing in the Yale University Child Study Center, uses the six developmental pathways (physical, cognitive, psychological, language, social, and ethical) to help schools make decisions about teaching and learning. This Web site includes information, research, and publications related to the Comer approach to school reform.

Carnegie Corporation of New York:

http://www.carnegie.org/starting_points/startpt1.html;

http://www.carnegie.org/sub/pubs/reports/great_transitions/gr_intro.html

Here you will find two reports from the Carnegie Corporation of New York, detailing the conditions of, and suggestions for, children at risk of failure in different age groups:

The Carnegie Corporation of New York. (1994). *Starting points: Meeting the needs of our youngest children. The report of the Carnegie Task Force on Meeting the Needs of Young Children*. New York: Carnegie Corporation of New York.

Report from the Carnegie Council of New York. (1995). *Great transitions: Preparing adolescents for a new century*. New York: Carnegie Corporation of New York.

VII. References and Recommended Readings

Note that the recommended readings are marked with an asterisk (*).

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- *Elkind, D. (2001). *The hurried child: Growing up too fast too soon*. Cambridge, MA: Addison-Wesley.
- Erikson, E. (1963). *Childhood and society*. New York: W. W. Norton & Co.
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- Gage, N. L., & Berliner, D. (1998). *Educational psychology*. Boston: Houghton Mifflin Co.
- Gilligan, C. (1982). *In a different voice: Psychological theory and women's development*. Cambridge, MA: Harvard University Press.

VII. References and Recommended Readings, cont'd.

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Notes
